

Domande ML

Supervised Learning

Linear Regression

- Ridge regression
- Ridge regression and compare it with Bayesian linear regression
- Bayesian linear regression and compare it with Ridge regression
- Ridge regression vs Lasso

Classification

- Describe K-Nearest Neighbor for classification
- Describe Logistic Regression and its properties
- Describe Logistic regression and compare it with the perceptron

Model Evaluation, Selection and Ensembles

- Describe Bias – Variance tradeoff for regression problems. How it's possible to evaluate it by looking at train and test error
- PCA technique
- Bias variance tradeoff and how it can be controlled in SVM
- Cross validation and for what it can be used

Computational Learning Theory

- Define the VC dimension and describe the importance and usefulness of VC dimension in ML
- Define the VC dimension, what is the VC dimension of a linear classifier?
- What can VC dimension of a hypothesis space can be used for and what is it?
- How can VC used to avoid overfitting

Kernel Methods

- Gaussian Process for regression problems
- What is a valid Kernel Function?
- Purpose of using kernels in ML. How can you construct a valid Kernel? Example of a ML method using Kernel and the advantage of doing so in that method
- How can a valid Kernel be built?

SVM

- Describe the Support Vector Machine
- Which algo can we use to train an SVM? Provide an upper bound to the generalization error of an SVM

Markov Decision Process

- Difference between on and off policy RL. Make an example for both
- Value iteration algo. Does it always return the optimal policy?
- Which methods can be used to compute the value function V of a policy π in a discounted MDP

- Describe the difference between model based and model free algo. Describe a model free algo for predicting the value of a given policy
- Describe 2 algorithms to perform model free policy evaluation
- Properties of the Bellman operators

Dynamic Programming

- Policy iteration technique for MDP
- Describe and compare value iteration and policy iteration

Monte Carlo Methods

- Differences between Montecarlo and Temporal Difference in the model free estimation of a value function
- Describe the two problems of RL prediction and control and how MC RL technique can solve them

Temporal Difference Learning

- Differences between Q-Learning and SARSA
- Describe TD(λ) for learning the value function of a given policy
- What are eligibility traces and how they are used in TD(λ). Explain what happens if $\lambda = 0$ and $\lambda = 1$

MAB

- Describe UCB1. Is it deterministic or stochastic?